

Work Order ID 110172

110172

Page 1

December-17-13 9:17:27 AM

Item ID: D350-748-101

Accept

N900040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Fwd Crosstube

Start Date: 12/17/13 Start Qty: 1.00

1

Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: *MLJ*

Date: *13-12-18* Tooling:

Date:

Run Start *NR1*

QC:

Date: SPC (Y/N):

Date:

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr
D350-748-141	G

100

0.00

*DAS
66
9-89*

100

DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPPD350-748-101

CHG003

*DAS
66
9-89*

FEB 11 2015

105

QC15- Crosstube Dimensional Check

0.00

105

QC

Memo

0.00

Quality Control

VERIFY WITH VENDER FOR OVEN TIME AVAILABILITY

NIA

14-10-29

Work Order ID 110172

110172

Page 2

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Required Date: 12/17/13 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

110

0.00

110

BENDING MACHINE - CROSSTUBES

0.00

CNC Bend 1

Memo

CNC Delta 100 Bender

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT _____

****UNDER BEND .225" PER SIDE****

****USE (4) DT9824 SHIM BLOC TO CHECK STRAIGHTNESS****

JW 14-10-29

120

QC6- Inspect dimensions to drawing

0.00

120

QC

Memo

0.00

Quality Control

****USE (4) DT9824 SHIM BLOC TO CHECK STRAIGHTNESS****

N/A 14-10-29
Done on 9/28

Work Order ID 110172

December-17-13 9:17:27 AM

110172

Page 3

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Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
125		0.00							
125									
Outsource1	Memo	0.00							
Outsource process - Heat Treat	ISSUE P/O TO METCOR: <u>26301</u>								
	Stress relief								
	Heat treat crosstube as per QSI010 4.3 within 12h after bending								
126	Receive & Inspect for Damage & Mat'l Certs	0.00							
126									
Packaging	Memo	0.00							
Packaging									
127	QC15- Crosstube Dimensional Check	0.00							
127									
QC	Memo	0.00							
Quality Control	***MARK CUT LINES***								

CX 14/10/29 ①

IX SP14-10-31

DAS
03
9-89

14-11-3

DAS
9
9-89

Work Order ID 110172

110172

Page 4

December-17-13 9:17:27 AM

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

128

0.00

128

Crosstubes

Crosstubes

Memo

0.00

CUT TUBE AT HEIGHT ON FAI SHEET

VERF HEIGHT 23.280 BY QC 15 LEVEL INSPECTOR S141414

VERF TWIST 0.076" BY QC15 LEVEL INSPECTOR S141414

TW 14-11-03

130

0.00

130

Crosstubes

Crosstubes

Crosstubes

Memo

0.00

2- Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs,
Set-up drill table as per QSI 010

3- Deburr

4- Engrave Part # and Batch # as per Dwg D350-748-141

5- Remove all marks from tube within limits of D350-748-141

6- Apply a light coat of LPS3 on the interior of tube

Batch: _____

TW 14-11-19

mm/B L 14/11/12

December-17-13 9:17:27 AM

Page 5

Packaging

Ensure certificate of conformity is attached

CH 14/11/25 ①

1x 8015-01-27

December-17-13 9:17:27 AM

Page 6

[illegible]

Work Order ID 110172

110172

Page 7

December-17-13 9:17:27 AM

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Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
178	QC5- Inspect part completeness to step on W/O	0.00				1			DAS 38 9-89
178									
QC	Memo	0.00							
Quality Control									JAN 30 2015
180	SprayPaint	0.00				1			CR 15-02-02
180									
SprayPaint	Memo	0.00							
Spray Painting	1-Prime inside crosstube as per QSI 005 4.2 BATCH: <u>M129806</u> 2-Prime Outside of Tube as per Dart QSI 005 4.2 BATCH: <u>131237</u>								
190	QC14- Inspect Spray Paint	0.00				1			DAS 38 9-89
190									
QC	Memo	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								15-02-09

150202
DAS
9-89
USE: Axial
T. S. H. G. 9-89

[Signature]

Work Order ID 110172***110172***

Page 8

December-17-13 9:17:27 AM

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Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
200		0.00							DAS
200	Crosstubes					<u>1</u>			41
Crosstubes	Memo	0.00							9-89
Crosstubes	INSTALL GROUND WIRE INSERT, THEN INSERT SCREW AND WASHER								15-2-3
	1-Abrade mating surfaces of support and crosstube with 180 grit sandpaper, clean the area with MEK or equivalent as per dwg								
	2-Install supports with Proseal 890 per D350-748-141 and QSI 015								
	A/R Proseal 890 Batch: <u>130986</u>								
	EXP: <u>6/15</u>								
	3-Install supports clamps Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS.								
	PROSEAL CURE TIME 72 HOURS:								
	Start: <u>15-2-3</u>								
	Finish: <u>15-2-6</u>								
	RE-CHECK TORCQUE ON CLAMP AFTER PROSEAL HAS CURED FOR 72HOURS AS PER DWG.								

Work Order ID 110172

December-17-13 9:17:27 AM

110172

Page 9

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Start Date: 12/17/13 Start Qty: 1.00

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Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00							DAS 38 9-89
210									
QC	Memo	0.00							
Quality Control	***RE-CHECK TORCQUE ON CLAMP AFTER PROSEAL HAS CURED FOR 72HOURS AS PER DWG.***								15-02-09
220	Pick Kit	0.00							
220									
Packaging	Memo	0.00							
Packaging									
230	QC4- 100% Inspect kits for completeness	0.00							
230									
QC	Memo	0.00							
Quality Control									

DAS
66
9-89

FEB 11 2015

Work Order ID 110172

110172

Page 10

December-17-13 9:17:27 AM

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Cust Item ID:

Required Date: 12/17/13 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
240	Packaging								
Packaging	Memo	0.00			DAS	06			
Packaging	Identify and pack for shipping as per PPP D350-748-101				46	9-89			
	Location: <u>C35</u>				9-89				
	PPP Rev: _____								
250	QC21- Final Inspection - Work Order Release	0.00							
250									
QC	Memo	0.00							
Quality Control									

FEB 12 2015

MCS 15-02-12

MF
15-2-12

Picklist Print

December-17-13 9:17:26 AM

Page 1

Work Order ID: 110172
Parent Item: D350-748-101
Parent Item Name: Fwd Crosstube

Start Date: 12/17/13
Start Qty: 1.00

Required Date: 12/17/13
Required Qty: 1.00

7

Comments: IPP Rev:A New Issue 06-07-05 JLM
IPP Rev:B Update qty of MS21042L5 06-09-12 KJ VERIFY BY:DD
IPP Rev:C Rev B 07-11-15 DD
IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F 10.08.04 added QSI010
4.3 DD verf:EC
IPP REV:G ADD UNDER BEND COMMENT 12-05-28 JLM IPP REV:H 12.11.05 as per dwg
D350-748-141G DD verf:JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
AN4-41A Bolt		Purchased	No			220	Each	674.0000	8	8			DAS 28 9-89
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				ST359		1							
				123346		1							
				ST515		2							
				121185		2							
				ST517		671							
				124241		171							
				124805		315							
				124836		185							
AN4-6A BOLT		Purchased	No			220	Each	1,235.0000	16	16			DAS 28 9-89
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				ST355		282							
				123355		30							
				M126175		2							
				M127410		250							
				ST514		953							
				M126317		953							

DAS
CS
9-89

DAS
CS
9-89

m130726

DAS
28
9-89

DAS
28
9-89

FEB 11 2015

Hex

Picklist Print

December-17-13 9:17:26 AM

Page 2

Work Order ID: 110172
Parent Item: D350-748-101
Parent Item Name: Fwd Crosstube

Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

AN5-32A
Bolt

Purchased No

220 Each 267.0000

4

④ m130716 DAS 28 9-89

DAS
CS
9-89

Location

Loc Qty

Loc Code

st503	267	
124215	218	
124805	5	
m127363	14	
m127550	30	

D3500-1
Saddle

Manufactured No

220 Each 97.0000

4

4

DAS 46 9-89
FEB 11 2015

DAS
CS
9-89

Location

Loc Qty

Loc Code

ST428A	12	
95810	12	
ST430A	66	
108799	40	
91888	8	
94620	18	
ST431	19	
95381	19	

B119743

4

D3501-1
Bushing

Manufactured No

220 Each 485.0000

16

16

DAS 46 9-89
FEB 11 2015

DAS
CS
9-89

Location

Loc Qty

Loc Code

ST043	160	
86913	160	
ST051	2	
103038	2	
ST052	323	
104369	80	
105395	90	
105576	40	
88532	1	
95165	112	

m120509

Picklist Print

December-17-13 9:17:26 AM

Page 3

Work Order ID: 110172
Parent Item: D350-748-101
Parent Item Name: Fwd Crosstube

Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

MS21042L4

Purchased

No

220

Each

4,214.0000

24

24

m130799

DAS
26
9-89

Locknut

Location

Loc Qty

Loc Code

FP001

38

122452

38

GA

30

m126333

30

ST314

9

m125708

9

st507

33

m126073

33

ST509

2008

m126275

114

m127255

1894

ST510a

85

m126333

85

ST518

2011

124231

154

m127376

1857

DAS
46
9-89

DAS
46
9-89

DAS
26
9-89

MS21042L5

Purchased

No

220

Each

840.0000

4

4

m131340

Nut

Location

Loc Qty

Loc Code

GA

5

117611

5

ST314

335

125535

335

ST509

500

m127304

500

DAS
CS
9-89

FEB 11 2015

December-17-13 9:17:26 AM

Shop Packet Print

Page 3

Picklist Print

December-17-13 9:17:26 AM

Page 4

Work Order ID: 110172
Parent Item: D350-748-101
Parent Item Name: Fwd Crosstube

Start Date: 12/17/13
Start Qty: 1.00

Required Date: 12/17/13
Required Qty: 1.00

NAS1149D0463J
WASHER

Purchased No

220 Each 5,122.0000 32

(32) m130799 DAS 26 9-89

Location	Loc Qty	Loc Code
ST294	143	
119097	1	
121912	24	
124198	35	
124778	83	
ST510a	4979	
M126221	22	
M127693	4957	

NAS1149D0563J
Washer

Purchased No

220 Each 4,123.0000 8

(8) m130799 DAS 26 9-89 FEB. 11 2015

Location	Loc Qty	Loc Code
GA	35	
m125807	35	
ST294	145	
122452	91	
123248	42	
123355	12	
ST510a	3943	
m126319	3943	

D350-748-141TRN
Crosstube Turning Detail

Manufactured No

110 Each 5.0000 1 1

Location	Loc Qty	Loc Code
LG014	5	
103232	1	
84656	1	
84658	1	
84661	1	
84665	1	

(1) TW 14-10-29

Picklist Print

December-17-13 9:17:26 AM

Page 5

Work Order ID: 110172
 Parent Item: D350-748-101
 Parent Item Name: Fwd Crosstube

Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

D3502-1 Manufactured No
 Support

200 Each 79.0000 2 2
 DAS 41 15-2-4
 9-89

Location	Loc Qty	Loc Code
LG050	79	
104334	6	
73419	3	
74873	1	
86876	1	
88465	24	
94722	20	
97212	12	
99764	12	

2

D3595-063-395 Manufactured No
 Rubber Cushion

200 Each 130.0000 2 2
 DAS 41 15-2-4
 9-89

115027

Location	Loc Qty	Loc Code
FG	5	
87353	5	
LG051	125	
100373	7	
102441	6	
102890	3	
105542	14	
108010	36	
109481	20	
87353	17	
94602	1	
97526	17	
98361	4	

2

Picklist Print

December-17-13 9:17:26 AM

Page 6

Work Order ID: 110172
Parent Item: D350-748-101
Parent Item Name: Fwd Crosstube

Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

ALS4-1032-225

Purchased

No

200

Each

848.0000

1

1

DAS

41

9.89

15-2-3

Rivnut

131067

Location

Loc Qty

Loc Code

FG

30

M127028

30

ST280

129

M125954

20

M127028

109

st555

689

M127092

689

NAS1149D0363J

Purchased

No

200

Each

4,179.0000

1

1

DAS

41

9.89

15-2-3

Washer

Location

Loc Qty

Loc Code

GA

89

124392

89

ST294

11

113068

11

ST510a

4079

m126319

4079

MS21920-22

Purchased

No

200

Each

103.0000

2

2

DAS

41

9.89

15-2-4

Clamp

128636

Location

Loc Qty

Loc Code

LG050

103

125487

5

M126420

4

M126637

4

M127255

40

M127608

50

December-17-13 9:17:26 AM

Shop Packet Print

Page 6

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December-17-13 9:17:26 AM

Page 7

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Start Date: 12/17/13

Required Date: 12/17/13

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10
SCREW

Purchased

No

200

Each

382.0000

1

1

DAS
41
9-89

15-2-3

Location

Loc Qty

Loc Code

GA

100

120449

100

ST305

26

122815

1

123522

18

125654

7

ST506

256

124326

10

m126474

246

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS <table style="width: 100%;"> <tr> <td>Skid-tube ☐</td> <td>Crosstube ☐</td> <td>Water Jet ☐</td> <td>Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>	Skid-tube ☐	Crosstube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
Skid-tube ☐	Crosstube ☐	Water Jet ☐	Engineering ☐															
Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐															
Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐															
Large Fab ☐	Composite ☐	Supplier ☐																

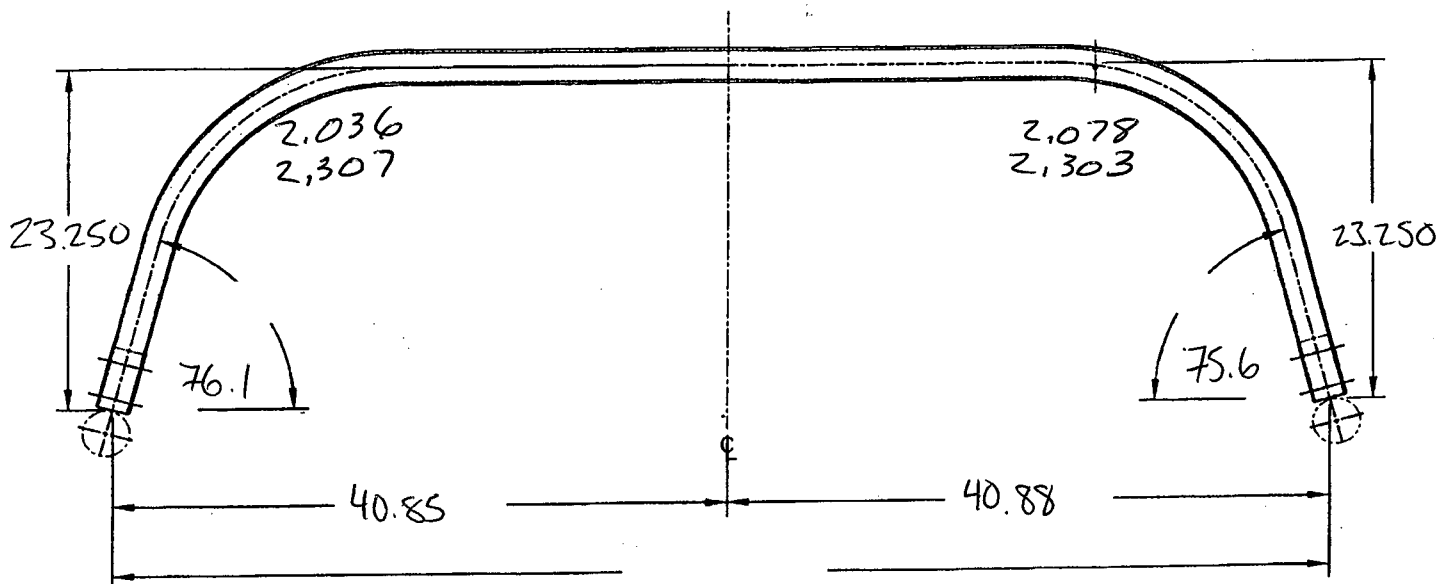
Root Cause	Date	Step	Qty	Description of work order update or non-conformance	Initial Chief Eng	Action Description	Sign & Date	Verification	QC Inspector
Design									
Doc/Data									
Equip/Tooling									
Handling/Pre									
Material									
Operator									
Offset/Setup									
Process									
Supplier									
Training									
Transport									
Unapproved									

FAULT CATEGORY

Landing Gear ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Inspection Strip in Tube ☐ Marks/Chatter ☐ Turning Sequence ☐ Wave/Twist in Tube	General ☐ Bend ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Burrs ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Drawing ☐ Drill Holes ☐ Finish ☐ Fit/Function	☐ Folio/Program ☐ Grain ☐ Hardware ☐ Inspection Incomplete/Unqualified ☐ Instructions Incomplete/Unclear ☐ Misaligned/off center ☐ Mislabeled ☐ Misread ☐ Off-set ☐ Out of Calibration ☐ Out of Sequence
		☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Positioned Wrong ☐ Power Loss/Surge
		☐ Pressure/Forced Set-up ☐ Temperature/Cure ☐ Weld ☐ Wrong Stock Pulled ☐ Other

DART AEROSPACE LTD	Work Order:	110172
Description: Crosstube High Fwd (AS350/355)	Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: G		Page 1 of 1

Required Dimension	Min	Max
Height	23.12	23.38
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.55	82.05
Bending Passes	7	--
Crushing	--	6%
Twist	--	0.25



	Side A	Side B
Bending Passes	37	35
Crushing	6.2%	5.1%
Comments		

QC15 Inspection	DP
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	
D	12.04.16	Added bending, crushing & twist dimensions	KJ	
E	13.02.27	Dwg Rev updated	KJ	

Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D3595-063-395	RUBBER CUSHION
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-22 OR MS 21920-21	CLAMP (PER DART SPEC. M-MS21920-21-22)
8	1	MS27039-1-10	SCREW
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH AFTER TURNING = 112.270±0.06 (AFTER BENDING/TRIMMING = 110.27 REF)
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER 'D350-748-141' AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES, EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

TURNING

- 10) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS2759/1E AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.

BENDING

- 12) ALL DIMENSIONS FOR BENT TUBE ARE POST STRESS RELIEF
- 13) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D. ON TOP HALF OF BEND, AND 7% ON BOTTOM HALF OF BEND.
- 14) MAX AMPLITUDE OF RIPPING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- 15) AFTER BENDING, STRESS RELIEVE TUBE AT 650°F ±0.25°F FOR A MINIMUM OF 2 HRS AND ALLOW TO COOL TO AMBIENT TEMPERATURE (REF AMS2759/1E).
- 16) MAX TWIST AFTER STRESS RELIEF: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

ASSEMBLY

- 17) TO INSTALL D3502-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 18) TORQUE CLAMPS 60 TO 80 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

110172 MJS
13-12-18

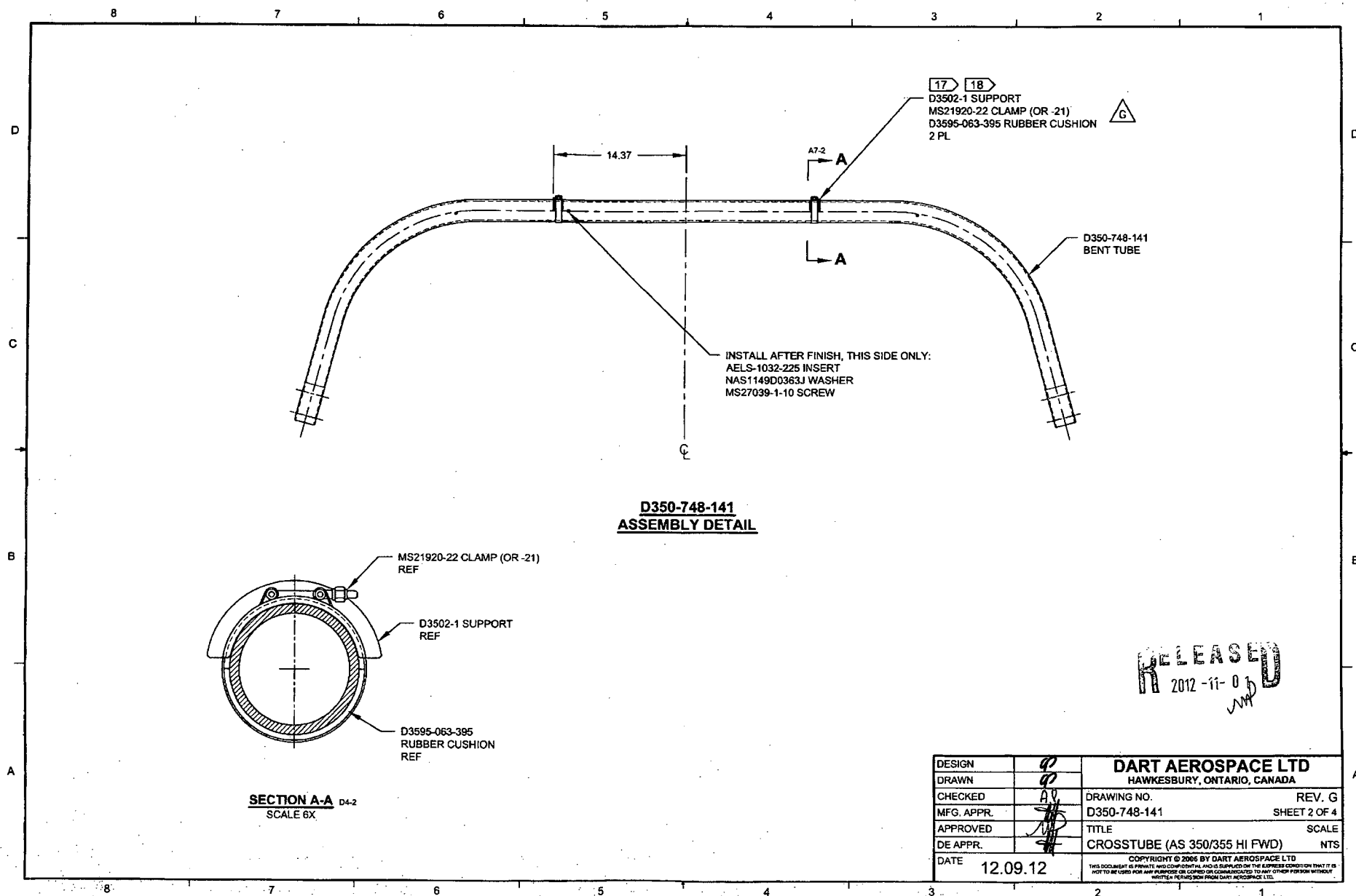
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R 2012-11-01
MJP

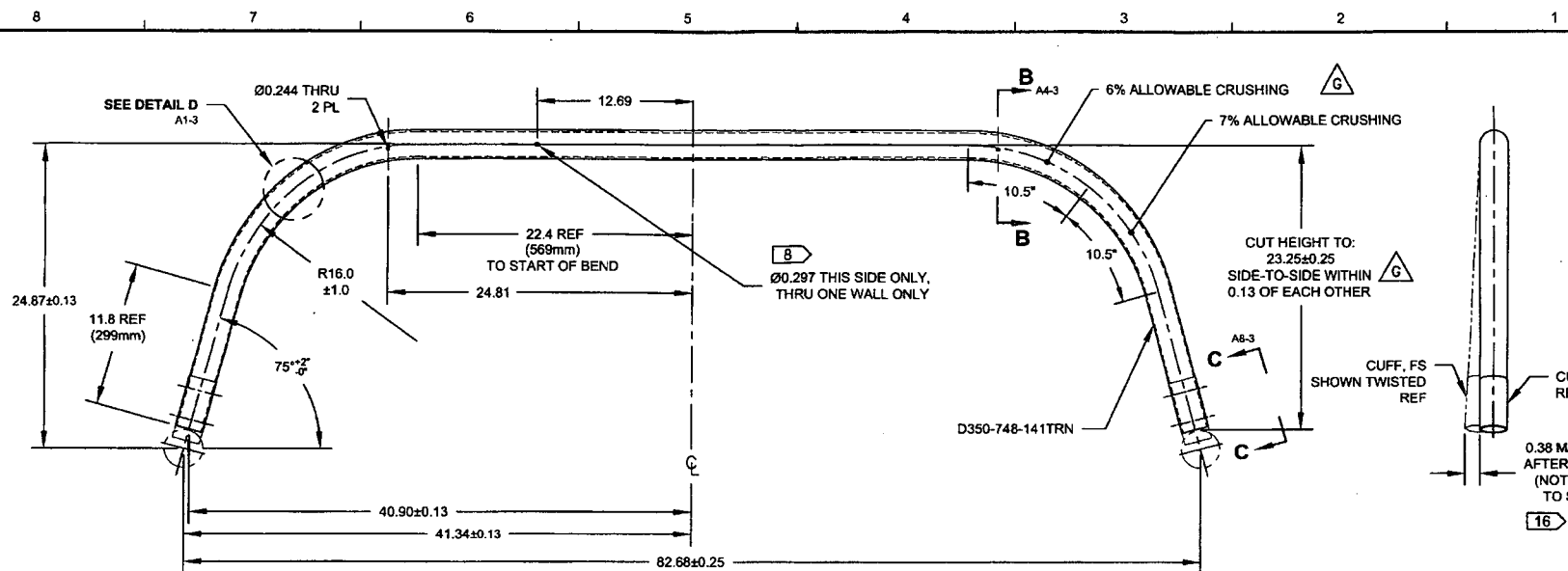
G	RMV ABRASION STRIP, SUPPORT NOW W/ PROSEAL & CUSHION, ADD STRESS RELIEF, LONGER CUFF, NOW TRIMD AFTER BEND, ADD WALL DIMS & UPDATE TOL.	CP	12.09.12
F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C8-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	08.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	12.09.12		

DART AEROSPACE LTD
HAWKESBURY, ONTARIO, CANADA

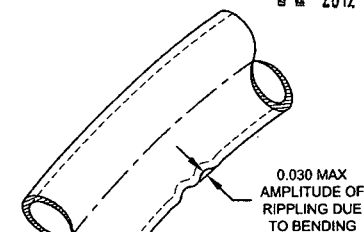
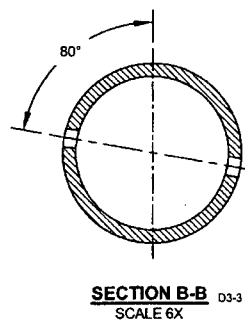
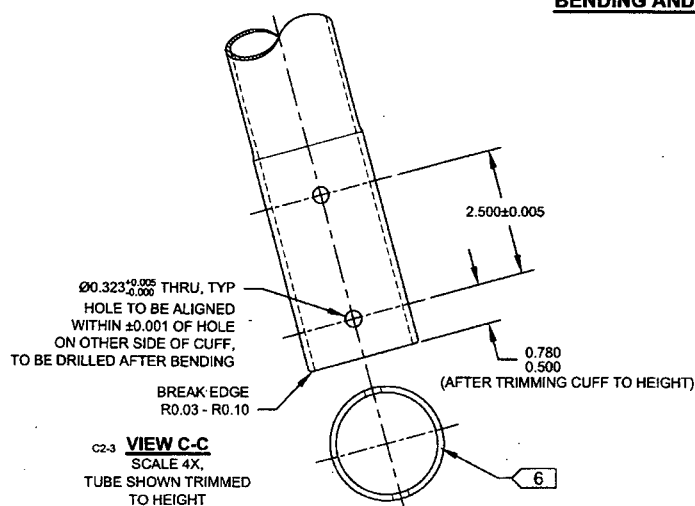
DRAWING NO. REV. G
D350-748-141 SHEET 1 OF 4
TITLE SCALE
CROSSTUBE (AS 350/355 HI FWD) NTS

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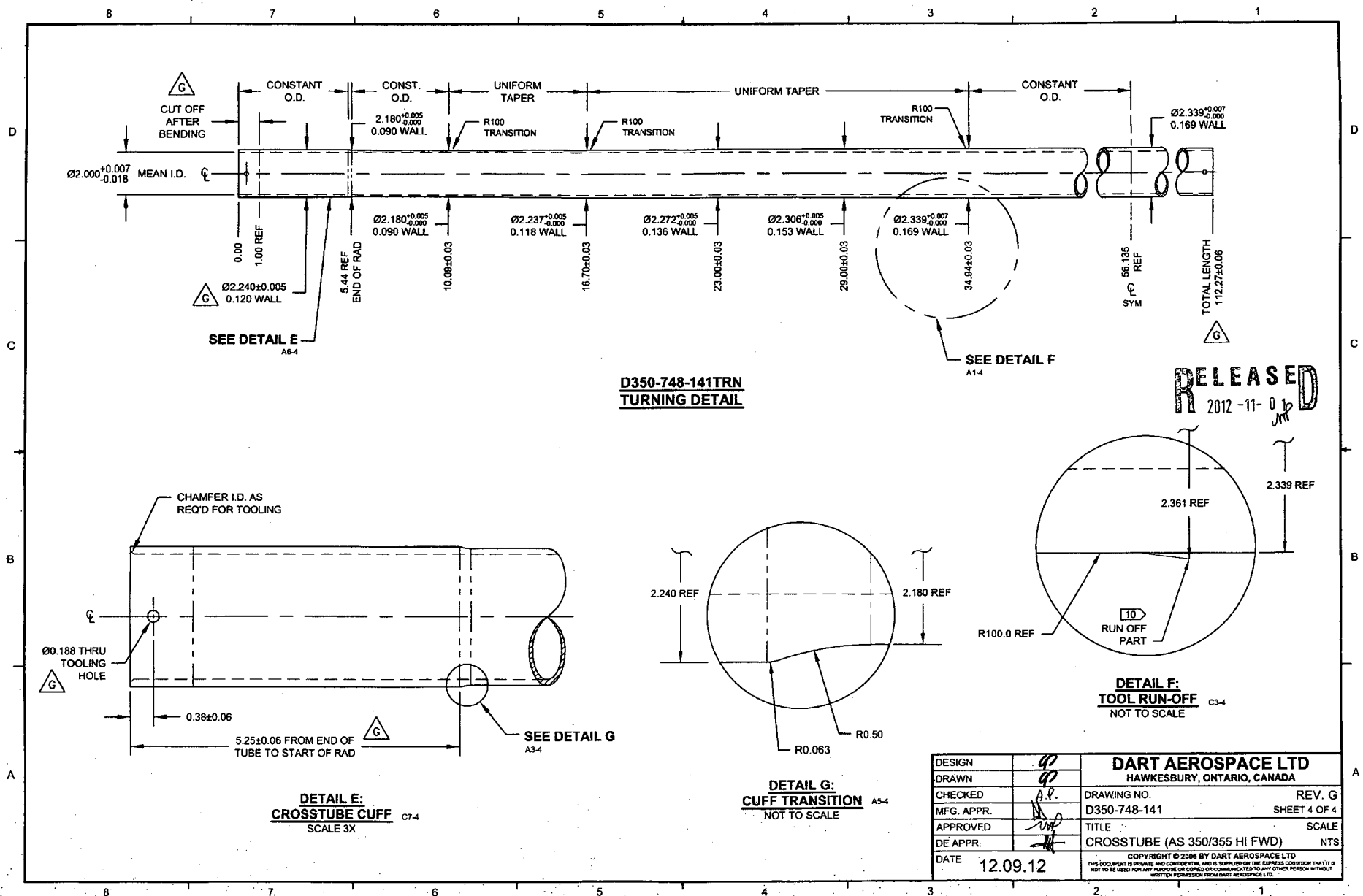


D350-748-141
BENDING AND DRILLING DETAIL 13



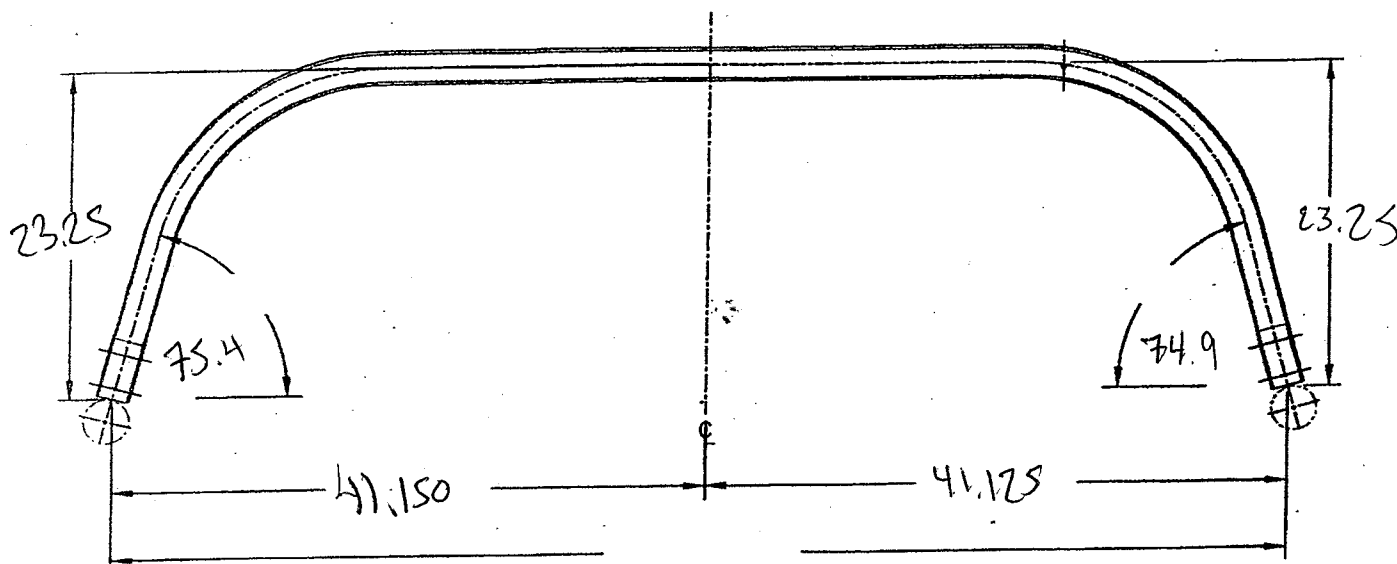
DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. G
MFG. APPR.		D350-748-141	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	12.09.12	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE, OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

RELEASED
 2012-11-01



DART AEROSPACE LTD		Work Order:	
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: G		Page 1 of 1	

Required Dimension	Min	Max
Height	23.12	23.38
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.55	82.05
Bending Passes	7	—
Crushing	—	6%
Twist	—	0.25



	Side A	Side B
Bending Passes	34	35
Crushing		
Comments		
twist = 0.038"		

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	
C	11.11.07	Dwg Rev updated	KJ	
D	12.04.16	Added bending, crushing & twist dimensions	KJ	
E	13.02.27	Dwg Rev updated	KJ	

T
ACE

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER
Purchase Order ID PO26301

Purchase Order Date 10/29/2014
PO Print Date 10/30/2014

Page Number 2 of 3

Order From :
METCOR INC.
560 BOUL. ARTHUR SAUVE
SAINT-EUSTACHE, QC J7R 5A8
CA

VC-MET004

Ship To : DART AEROSPACE LTD
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name
Vendor Phone 450 473 1884

Ship To Contact
Ship To Phone
Ship Via: Dart Truck
Ship Acct:

Buyer Chantal Lavoie
Customer POID
Customer Tax # 10127-2607
Terms Net 30
Currency CAD
FOB FCA - (Free Carrier)

3	110172	D350-748-101 CROSSTUBE	10/31/2014	1.00 ✓	\$275.53	\$275.53
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HEAT TREAT CROSSTUBE AS PER QSI010 4.3
WITHIN 12H AFTER BENDING

Yes
10/31/2014

8014-10-31

Line Total: \$275.53

4	121505	D350-748-101 CROSSTUBE	10/31/2014	1.00	\$275.53	\$275.53
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HEAT TREAT CROSSTUBE AS PER QSI010 4.3
WITHIN 12H AFTER BENDING

Yes
10/31/2014

Line Total: \$275.53

5	110171	D350-748-101 CROSSTUBE	10/31/2014	1.00	\$275.53	\$275.53
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HEAT TREAT CROSSTUBE AS PER QSI010 4.3
WITHIN 12H AFTER BENDING

Yes
10/31/2014

Note:

10/30/2014

METCOR INC.

560 BOUL. ARTHUR SAUVE
ST-EUSTACHE, QC J7R 5A8
Tel: 450-473-1884 / Fax: 450-491-5498

Reçu de livraison

Delivery Receipt

BON DE TRAVAIL Order	EXPÉDITEUR Shipper ID	BON D'EXPÉDITION Shipper
200096	1	85725

EXPÉDITION COMPLÈTE / Shipped Complete

CLIENT / Customer 215

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
Ph: 613-632-5200
Fax: 613-632-1053

LIVRÉ À / Shipped To

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
Ph: 613-632-5200
Fax: 613-632-1053



COMMANDE DU CLIENT Customer PO	BON DE LIVRAISON DU CLIENT Customer Shipper No.	TYPE DE MATÉRIEL Material Type	DATE DE LA COMMANDE Order Date	TRANSPORTEUR Carrier
26301		Steel	2014/10/29	client

QUANTITÉ Quantity	N° PIÈCE Part No.	NOM DE LA PIÈCE Part Name	DESCRIPTION DE LA PIÈCE Part Description	POIDS Weight
----------------------	----------------------	------------------------------	---	-----------------

6 D350-748-101

GROSSTUBE

(1) D350-748-101 -113097

(1) D350-748-101 -113099

(1) D350-748-101 110172 ✓

(1) D350-748-101 121505

(1) D350-748-101 110171

180

SP14-10-31

1 NIL

TYPE DE CONTENEUR Container Type	# DE CONTENEURS # Of Containers	COMMENTAIRES CONTENEUR Container Comments
-------------------------------------	------------------------------------	--

NIL

1

CERTIFICAT

EMPAQUETAGE Packing	
------------------------	--

QUANTITÉ EXPÉDIÉE / Quantity Shipped : 6

POIDS EXPÉDIÉ / Weight Shipped : 180,00

QUANTITÉ RESTANTE / Quantity Remaining : 0

POIDS RESTANT / Weight Remaining : 0,00

CERTIFICAT

QUANTITÉ EXPÉDIÉE / Quantity Shipped : 6

POIDS EXPÉDIÉ / Weight Shipped : 180,00

Signature:

Date:

METCOR INC.

500 BOUL. ARTHUR-SAUVÉ, ST-EUSTACHE, QC, J7R 5A8

Tél.: 450-473-1884

Télécopieur / Fax administration: 450-491-5498

Télécopieur / Fax production: 450 491-6454

Rapport d'Inspection**Inspection Report**

BON DE TRAVAIL order	CHARGEMENT load
200096	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	MAÎTRE D'OEUVRE prime contractor	PROGRAM
26301		Steel		

SPÉCIFICATIONS DU PROCÉDÉ

processing specifications

STRESS REL

SAE AMS 2768/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results

Visual

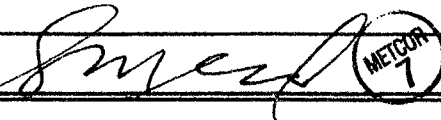
QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
6	180	D350-748-101 CROSSTUBE (1) D350-748-101 -113097 (1) D350-748-101 -113099 (1) D350-748-101 110172 (1) D350-748-101 121505 (1) D350-748-101 110171 1 NIL

8014-10-31

30 04

COMMENTAIRES / comments

APPROUVÉ par / Approved by:


METCOR
7

DATE: 2014-10-30

METCOR INC.

560 BOUL. ARTHUR-SAUVÉ, ST-EUSTACHE, QC, J7R 5A8

Tél.: 450-473-1884

Télécopieur / Fax administration: 450-491-5498

Télécopieur / Fax production: 450 491-6454

Certificat de Conformité Détaillé.

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
200096	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

1

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	MAÎTRE D'OEUVRE prime contractor	PROGRAM
26301		Steel		
SPÉCIFICATIONS DU PROCÉDÉ processing specifications				
STRESS REL				
SAE AMS 2759/1 REV.E				
EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results				
Visual				
QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description		
6	180	D350-748-101 CROSSTUBE (1) D350-748-101 -113097 (1) D350-748-101 -113099 (1) D350-748-101 110172 (1) D350-748-101 121505 (1) D350-748-101 110171 (1) D350-748-101 113098 1 NIL		

COMMENTAIRES / comments

STRESS RELIEF 343C, 2 HRS

Le traitement thermique (TT) a été fait en utilisant des équipements en conformité avec AMS2759.

Le TT a été fait tel que requis par AMS2759 et toutes les vérifications et les tests demandés ont été faites et documentés. Aucun changement n'a été faite par rapport au TT. On certifie que le matériel a été fabriqué, échantillonné, testé et inspecté en accord avec AMS2759 et le bon de commande et le matériel rencontre les exigences spécifiées.

Heat treatment (HT) was performed with equipment that meets the requirements of AMS2759.

All HT operations were in compliance with AMS2759 and all verifications have been performed and documented. No unauthorized changes were performed in regards to the HT. We certify that the material was manufactured, sampled, tested and inspected in accordance with AMS2759 and the purchase order and was found to meet the requirements.

APPROUVÉ par / Approved by: Isabel Otero QA Technician  DATE: 2014-10-30



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID: PO26611

Purchase Order Date 11/25/2014

PO Print Date 11/25/2014

Page Number 1 of 5

Order From :

VC-CAD002

Ship To : DART AEROSPACE LTD

CADORATH COATING
2150 LOGAN AVE.
WINNIPEG, MB R2R 0J2
CA

1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

PAID

Contact Name

Vendor Phone 204 633 9420

Ship To Contact

Ship To Phone

Ship Via: Day & Ross collect

Ship Acct:

Buyer

Chantal Lavoie

Customer POID

Customer Tax #

10127-2607

Terms

Net 30

Currency

CAD

FOB

Destination-Collect

Line No	Reference Vendor Part Number Line Comments Delivery Comments	Description/ Mfg ID	Req Date/ Taxable Promise Date	CD	Req Qty/ Unit of Measure	PO Unit Price	Extended Price
110171		D350-748-101 CROSSTUBE	12/19/2014 Yes 12/19/2014		1.00	\$803.42	\$803.42
Stress relief at 375degree for 5hrs Magnetic Particle Inspect per ASTM E1444 Cad Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375 degree for 8 hrs, Chromate Treat Coat C req'd							
Line Total:							\$803.42
110172		D350-748-101 CROSSTUBE	12/19/2014 Yes 12/19/2014		1.00 ✓	\$803.42	\$803.42
FINISH: SAME AS ABOVE							

SP15-01-27

Line Total: \$803.42

Note:

11/25/2014

Packing Slip



Cadorath Coating

2150 Logan Avenue, Winnipeg, Manitoba R2R-0J2

Phone: (204) 633-9420 Fax: (204) 633-8033

INVOICE NUMBER:

S74804

Sold To:

Dart Aerospace Ltd.

1270 Aberdeen St.

Hawksbury, ON K6A 1K7

ShipTo:

Net 2% Interest Per Month charged on Overdue Accounts.

Any claims for shortages, overcharges, or damaged goods must be made within seven (7) days from receipt of goods.

Customer Order #:	Date Received:	Terms:	G.S.T. #:	Ship Via:	Ship Date:
PO26611	Dec-31-2014	NET 30 DAYS	10071 6547 RT0001		Jan-22-2015

Item # Qty P/N & Description

1	1 EA	CROSSTUBE	S/N 110171
		P/N d350-748-101	W/O 142527
2	1 EA	CROSSTUBE	S/N 110172
		P/N d350-748-101	W/O 142528
3	1 EA	CROSSTUBE	S/N 113097
		P/N d350-748-101	W/O 142529
4	1 EA	CROSSTUBE	S/N 113098
		P/N d350-748-101	W/O 142530
5	1 EA	CROSSTUBE	S/N 113062
		P/N D350-748-201	W/O 142531
6	1 EA	CROSSTUBE	S/N 113063
		P/N D350-748-201	W/O 142532
7	1 EA	CROSSTUBE	S/N 113067
		P/N D350-748-201	W/O 142533
8	1 EA	CROSSTUBE	S/N 110106
		P/N D350-748-201	W/O 142534
9	1 EA	CROSSTUBE	S/N 110108
		P/N D350-748-201	W/O 142535
10	1 EA	CROSSTUBE	S/N 121505
		P/N D350-748-101	W/O 142536
11	1 EA	CROSSTUBE	S/N 122288
		P/N D350-748-101	W/O 142537

SP15-01-27

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Jan-22-2015

CONSIGNEE TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 142528

INVOICE #: 74804

**CONTRACT OR
PURCHASE ORDER #** PO26611

DESCRIPTION: CROSSTUBE

QTY 1

P/N # d350-748-101

S/N # 110172

STRESS RELIEF BAKE HEAT CHART # 14-1216.MPI IAW ASTM-E-1444. CADMIUM PLATE IAW AMS-QQ-P-416C TYPE 2 YELLOW CLASS 1. FINAL MPI IAW ASTM-E-1444. EMBRITTLE RELIEF BAKE HEAT CHART # 15-38.

SP15-01-27

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:





Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID **PO27244**

Purchase Order Date 1/28/2015

PO Print Date 1/29/2015

Page Number 2 of 7

Order From :
SKYSERVICE
6120 MIDFIELD ROAD
MISSISSAUGA, ONTARIO L5P 1B1
CANADA

VC-SKY001

Ship To : DART AEROSPACE LTD
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name
Vendor Phone 905-678-5636

Ship To Contact
Ship To Phone
Ship Via: Delivered
Ship Acct:

Buyer Chantal Lavoie
Customer POID
Customer Tax # 10127-2607
Terms Net 30
Currency CAD
FOB FCA - (Free Carrier)

3	122945	D4464-041 FUEL TANK	1/29/2015	1.00	\$0.00	\$0.00
			Yes			
			1/29/2015			
	SAME AS ABOVE					

Line Total: \$0.00

4	110172	D350-748-101 CROSSTUBE	1/29/2015	1.00 ✓	\$0.00	\$0.00
			Yes			
			1/29/2015			
	SAME AS ABOVE					

815-01-26

Line Total: \$0.00

5	110171	D350-748-101 CROSSTUBE	1/29/2015	1.00 ✓	\$0.00	\$0.00
			Yes			
			1/29/2015			
	SAME AS ABOVE					

815-01-29

Line Total: \$0.00

Note:

1/29/2015



skyservice

Work Order Traveler

Sky Service F.B.O. Inc.

DOT APP 53-89 / EASA 145.7142 / BDA AMO 385

WO #: MWO21993	Customer: Dart Aerospace Ltd.	Dept: NDT YUL	Reference: PO: 27244
Descr:	PN:	S/N:	Qty: 1
Make:	Model:	Reg:	A/C S/N:
TSN: 0	CSN: 0	TSO: 0	
Task: UNSCHEDULED			Sequence: 1

Work Required:

CARRY OUT NDT ON THE FOLLOWING FWD CROSTUBES
ID # D350-748-101
WORK ORDER ID'S # 110172, 110171, 113092, 113098, 121505

CARRY OUT NDT ON THE FOLLOWING AFT CROSTUBES
ID # D350-748-201
WORK ORDER ID'S # 113063, 113062, 113062, 110106, 110108

Action Taken:	Date:	Initial/Stamp:
LIQUID PENETRANT INSPECTION CARRIED OUT ON ITEMS LISTED ABOVE IAW ASTM E-1417M-13 ANY SUSPECT INDICATIONS VERIFIED BY EDDY CURRENT.	JAN 27 2015	

Description	Location	P/N	Qty	Batch	S/N Off	S/N On
LPI - ARDROX		970825E				
BLACK LIGHT		S/N: M-20142				
EDDY CURRENT		NORTEC 500,5		S/N: M20323	CAL. 11/NOV/2015	

SP 15-01-27

I certified that the maintenance described above has been performed in accordance with the applicable standard of airworthiness.

Signature:	ACA/SCA Stamp 	Date: JAN 27 2015
Name: RAFIK MELIKIAN		



Imron® 3.5 HG + High Gloss Polyurethane Topcoat (RH Quality)



GENERAL

DESCRIPTION

A high gloss 3.5 lbs/gal VOC conforming, low HAPS, polyurethane topcoat based upon unique Axalta formulations and resin technology. The resulting finish product provides a brush, roll or sprayable topcoat designed for use in any environment where long term color and gloss retention are desired.

SUGGESTED USES

As a high performance topcoat over suitable primers or properly prepared steel, galvanized steel, stainless steel, aluminum, concrete, concrete block, fiberglass, plastics and wood where:

- Long term color retention is desired
- Long term gloss retention is desired
- Compliance with 3.5 lbs VOC regulations is desired
- Use in corrosive or industrial marine environments is needed
- Application by brush, roll or spray is desired
- Excellent chemical resistance is desired
- Outstanding flexibility is needed
- Faster dry times are desired

COMPATIBILITY WITH OTHER COATINGS

- Aged Imron 3.5 HG + may be re-coated with itself following washing with clean, fresh water – no mechanical surface preparation is required.
- Imron 3.5 HG + can be applied over other Axalta coatings including, but not limited to Imron Industrial Strength primers and other Imron primers, Imron waterborne polyurethane copolymer coatings, Corlar® epoxies, Tufcote® acrylics, and Tufcote alkyd primers.
- Imron 3.5 HG + may be used over most aged and hard-cured coatings in good condition. Testing for lifting, bubbling and adhesion is recommended to assure compatibility with unknown coatings. Contact your Axalta representative for specific recommendations.

NOT RECOMMENDED FOR

Immersion service or floors

PERFORMANCE PROPERTIES

Abrasion & Mechanical	Excellent
Alkalis	Excellent
Humidity	Excellent
Solvents	Excellent
Color & Gloss Retention	Excellent
Acids	Excellent
Salts	Excellent
Weather	Excellent

The products referenced herein may not be sold in your market. Please consult your distributor for product availability.

COLOR

Imron 3.5 HG + consists of a mixing system utilizing 19 tints and 1 binder (3500P™) to specific mixing formulas. Select high-volume factory package colors are also available. Thousands of custom colors can be mixed.